



Serial No. 3935
(D.c.3)

ICNAF Res.Doc. 76/VI/112

THE PROBLEM OF SPECIES COMPOSITION AND
VALUE OF BY-CATCH OBTAINED IN THE COURSE
OF A SPECIALIZED GRENADIER, MACROURUS
RUPESTRIS, FISHERY IN THE NORTH-WEST ATLANTIC

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The fishery of grenadier *M.rupestris* in the North-West Atlantic is mainly conducted by the USSR fishing vessels, the yield taken by them comprises more than 90 percent of the total annual catch of this species harvested by all the countries. Grenadier is caught by bottom trawls at depths from 500-600m through 1300 m (Savvatimsky, 1969, Pechenik, Troyanovsky 1970). At such great depths commercial concentrations of grenadier are formed in some arear of the continental slope washed by warm waters having the temperature not lower than 3,5° - 4° C (Zilanov, Troyanovsky, Shepel, 1970). Within the life cycle of grenadier, the formation of commercial concentrations in the North-West Atlantic coincides with the fattening period which lasts from June till December (Podrazhanskaya, 1969; Konstantinov, Podrazhanskaya, 1972). In the first half of the period, schools migrate from great depths to less ones, and in its second half they leave them for deep layers not yet accessible for commercial fishery (Zilanov, Troyanovsky, Shepel, 1970). Thus,

grenadier concentrations are caught in time of their feeding migrations at depths from 500m - 600m to 1300m, more often within the limits of 650m - 1200 m. In conjunction with the migration of grenadier up to the depths of 500 - 1300 m, it is of great concern to know what other fish species and in what quantities are harvested as by-catch when specialized grenadier commercial fishery is being conducted. With this purpose 2318 bottom trawlings have been analysed. They were performed by commercial and scouting vessels in the areas of the continental slope, where specialized grenadier fishery is usually conducted.

Bottom otter trawl with mesh size prescribed by the Convention was applied there. Every commercial trawling was analyzed where grenadier made 60 percent of the catch taken or more. The species composition is generalized depthwise beginning from 500m through 1300m with the interval of 100m. Singular fishes were related to the column 'other species'. Different species of shark, skates, luminous pelagic fishes, Notacanthidae, roughhead grenadier Macrourus berglax, alepicephalus, northern wolffish were included there. The size of the by-catch, its main species composition are given by areas, subareas of the North-West Atlantic in Tables 1 - 6. The bulk of the by-catch consists of small number of fish species throughout all the subareas in the areas of intensive specialized bottom grenadier fishery. These fish species are Greenland halibut, deepwater redfish Sebastes mentella, cod which in sum make 4,6%

in the area of the Grand Newfoundland Bank (Subarea 3K), from 1,8 percent up to 29,1 percent in the Labrador area (Subareas 2J, H, G), 7,5 percent - in the Baffin Land area (Subarea O), 4,3 percent in the waters off West Greenland (Subarea 1). By the way cod were observed in small numbers in time of trawlings at depths from 500 through 700m both in Subarea 3K of the North Newfoundland Bank and in Subarea 2H of the Central Labrador, and only in Subarea 2J (South Labrador) the by-catch of this fish species made 4,8 percent and was surveyed up to 800m depth. Apparently cod were harvested not near the bottom, but in water mass in time of the trawl hauling. Sebastes mentella were recorded throughout all the areas though their share was not similar everywhere (Tables 1 - 6). The bulk of this species - up to 14,4 percent was registered in the South Labrador area (Subarea 2J), the depth of their habitat was the maximum one just in this Subarea, i.e. 800-900 m versus other Subareas.

Greenland halibut are the most often observed fish species taken as by-catch in the grenadier fishery, they make from 1,8 percent through 9,7 percent of the total catch depending on the area of the fishery (Tables 1-6). Greenland halibut inhabit deep water layers like grenadier, but in contrast to grenadier this species forms commercial concentrations at lower temperatures. Therefore, only scarce number of Greenland halibut approach the continental slope, where specialized grenadier fishery is performed. Greenland halibut may be observed in the water layers up to 1200m, their

concentrations are more dense at the depths from 500 through 800 m (Tables 1-6). K.G.Konstantinov and S.G. Podrazhanskaya (1972) studied the grenadier feeding habits and in their feeding interrelations with many deep water fish species as well as with the ones inhabiting continental shelf and slope, i.e. with cod, Sebastes mentella, Northern wolffish, Greenland halibut, the results of their investigations allowed to come to a conclusion that the feeding spectrum for every of the above mentioned fish species is represented by mainly different food items and that grenadier does not compete with fish species mentioned above.

Thus, the by-catch of cod, Sebastes mentella, Greenland halibut and other fish species is not higher than 8 percent in major part of subareas in specialized bottom fishery of grenadier in the North-West Atlantic. The South Labrador area (Subarea 2J) is the exception of the other ones, as the by-catch made about 29 percent there mainly due to Sebastes mentella and Greenland halibut, while the share of cod was only 4,8 percent in this area.

Table 1. The depthwise change of species composition of the catch for grenadier macrurus fishery in the area of the North Newfoundland Bank, Div. 3K.

/April - December 1967 - 1974/

Depth m	Number of trawlings	Total catch in tons	Catches per one trawling in tons	Fish species*				
				Grenadier macrurus	Greenland halibut	Deepwater redfish	Cod	Other
500-600	11	49,1	4,4	$\frac{48,2}{98,2}$	$\frac{0,5}{1,0}$	$\frac{0,2}{0,4}$	$\frac{0,1}{0,2}$	$\frac{0,1}{0,2}$
601-700	59	274,3	4,6	$\frac{262,5}{95,8}$	$\frac{10,8}{3,9}$	$\frac{0,6}{0,2}$	$\frac{0,1}{+}$	$\frac{0,3}{0,1}$
701-800	230	764,3	3,3	$\frac{713,0}{93,3}$	$\frac{46,2}{6,0}$	$\frac{3,4}{0,4}$	-	$\frac{1,7}{0,2}$
801-900	173	427,3	2,5	$\frac{417,1}{97,6}$	$\frac{10,1}{2,4}$	-	-	$\frac{0,1}{+}$
901-1000	38	11,0	0,3	$\frac{10,9}{99,1}$	$\frac{0,1}{0,9}$	-	-	-
1001-1100	63	17,3	0,2	$\frac{17,3}{100,0}$	-	-	-	-
1101-1200	37	7,2	0,2	$\frac{7,2}{100,0}$	-	-	-	-
Total:	611	1550,5	2,5	$\frac{1476,2}{95,3}$	$\frac{67,7}{4,3}$	$\frac{4,2}{0,3}$	$\frac{0,2}{+}$	$\frac{1,2}{0,1}$

* In all the tables numerators show the catch of each species in tons while denominators mean the percentage of the total catch at the corresponding depth.

Table 2. The depthwise change of species composition of the catch for grenadier macrurus fishery in the area of South Labrador, Div. 2J.

(May - December 1967-1968)

Depth m	Number of Trawlings	Total catch in tons	Catches per one trawling in tons	Fish species				
				Grenadier macrurus	Greenland halibut	Deepwater redfish	Cod	Other
500-600	17	19,7	1,1	$\frac{14,0}{71,2}$	$\frac{4,9}{24,8}$	$\frac{0,3}{1,5}$	$\frac{0,4}{2,0}$	$\frac{0,1}{0,5}$
601-700	36	95,4	2,6	$\frac{63,7}{66,9}$	$\frac{7,5}{7,8}$	$\frac{16,9}{17,7}$	$\frac{7,2}{7,5}$	$\frac{0,1}{0,1}$
701-800	21	66,8	3,1	$\frac{51,0}{76,6}$	$\frac{5,0}{7,4}$	$\frac{9,2}{13,7}$	$\frac{1,3}{1,9}$	$\frac{0,3}{0,4}$
801-900	3	1,0	0,3	$\frac{0,8}{80,0}$	$\frac{0,1}{10,0}$	$\frac{0,1}{10,0}$	-	-
901-1000	2	1,0	0,5	$\frac{0,9}{90,0}$	$\frac{0,1}{10,0}$	-	-	-
Total:	79	183,9	2,3	$\frac{130,4}{70,9}$	$\frac{17,6}{9,7}$	$\frac{26,5}{14,4}$	$\frac{8,9}{4,8}$	$\frac{0,5}{0,2}$

Table 3. The depthwise change of species composition of the catch for grenadier macrurus fishery in Central Labrador, Div. 2H.

Depth m	Number of trawlings	Total catch in tons	Catches per one trawling in tons	Fish species				
				Grenadier macrurus	Greenland halibut	Deepwater redfish	Cod	Other
500-600	41	96,0	2,3	$\frac{91,4}{95,3}$	$\frac{4,4}{4,5}$	$\frac{0,1}{0,1}$	$\frac{0,1}{0,1}$	-
601-700	26	92,5	3,7	$\frac{86,1}{92,2}$	$\frac{6,0}{6,4}$	$\frac{0,3}{0,3}$	-	$\frac{0,1}{0,1}$
701-800	9	46,4	5,1	$\frac{46,2}{99,6}$	$\frac{0,2}{0,4}$	-	-	-
801-900	7	7,5	1,0	$\frac{7,0}{93,4}$	$\frac{0,5}{6,6}$	-	-	-
901-1000	2	3,0	1,5	$\frac{3,0}{100,0}$	-	-	-	-
Total:	84	245,4	3,0	$\frac{233,7}{95,3}$	$\frac{11,1}{4,5}$	$\frac{0,4}{0,2}$	$\frac{0,1}{+}$	$\frac{0,1}{+}$

Table 4. The depthwise change of species composition of the catch for grenadier macrurus fishery in North Labrador Div. 2G. (June - November, 1967-1974)

Depth m	Number of trawlings	Total catch in tons	Catches per one trawling in tons	Fish species				
				Grenadier macrurus	Greenland halibut	Deepwater redfish	Cod	Other
500-600	40	138,0	3,4	$\frac{128,4}{93,0}$	$\frac{9,4}{6,8}$	$\frac{0,1}{0,1}$	-	$\frac{0,1}{0,1}$
601-700	25	109,7	4,4	$\frac{108,5}{98,9}$	$\frac{1,1}{1,0}$	$\frac{0,1}{0,1}$	-	-
701-800	101	448,2	4,4	$\frac{435,0}{97,2}$	$\frac{13,1}{2,9}$	-	-	$\frac{0,1}{+}$
801-900	84	449,4	5,3	$\frac{442,3}{98,5}$	$\frac{7,0}{1,5}$	-	-	$\frac{0,1}{+}$
901-1000	62	381,3	6,1	$\frac{380,0}{99,7}$	$\frac{1,3}{0,3}$	-	-	-
1001-1100	28	150,1	5,3	$\frac{147,0}{98,1}$	$\frac{3,0}{1,9}$	-	-	$\frac{0,1}{+}$
1101-1200	36	222,5	6,1	$\frac{222,2}{99,9}$	$\frac{0,3}{0,1}$	-	-	-
1201-1300	6	26,0	4,3	$\frac{26,0}{100,0}$	-	-	-	-
Total:	382	1925,2	5,0	$\frac{1889,4}{98,1}$	$\frac{35,2}{1,8}$	$\frac{0,2}{+}$	-	$\frac{0,4}{0,1}$

Table 5. The depthwise change of species composition of the catch for grenadier macrurus fishery in the area of Baffin Land, Stat. Area 0.

(June - October 1967-1974)

Depth m	Number of Trawlings	Total catch in tons	Catches per one trawling in tons	Fish species				
				Grenadier macrurus	Greenland halibut	Deepwater redfish	Cod	Other
500-600	96	682,9	7,1	$\frac{669,8}{98,2}$	$\frac{11,8}{1,7}$	$\frac{1,1}{0,1}$	-	$\frac{0,2}{+}$
601-700	387	1358,4	3,5	$\frac{1280,9}{94,3}$	$\frac{23,5}{5,4}$	$\frac{3,8}{0,2}$	-	$\frac{0,2}{+}$
701-800	325	997,8	3,0	$\frac{861,2}{86,4}$	$\frac{130,0}{13,0}$	$\frac{6,5}{0,6}$	-	$\frac{0,1}{+}$
801-900	160	505,6	3,2	$\frac{465,6}{92,1}$	$\frac{40,0}{7,9}$	-	-	-
901-1000	8	23,5	2,9	$\frac{23,3}{99,2}$	$\frac{0,2}{0,8}$	-	-	-
1001-1100	2	1,3	0,6	$\frac{1,3}{100,0}$	-	-	-	-
1101-1200	2	1,0	0,5	$\frac{1,0}{100,0}$	-	-	-	-
Total:	980	3570,5	3,6	$\frac{3303,1}{92,5}$	$\frac{255,5}{7,2}$	$\frac{11,4}{0,3}$	-	$\frac{0,5}{+}$

Table 6. The depthwise change of species composition of the catch for grenadier macrurus fishery in the waters off West Greenland, Subarea 1.

(May - October 1970-1974)

Depth m	Number of Trawlings	Total catch in tons	Catches per one trawling in tons	Fish species				
				Grenadier macrurus	Greenland halibut	Deepwater redfish	Cod	Other
500-600	6	5,8	1,0	$\frac{3,6}{81,1}$	$\frac{1,0}{17,2}$	$\frac{0,1}{-}$	-	$\frac{0,1}{1,7}$
601-700	103	280,2	2,7	$\frac{259,5}{92,7}$	$\frac{20,6}{7,3}$	-	-	$\frac{0,1}{+}$
701-800	95	346,7	3,6	$\frac{337,2}{97,3}$	$\frac{9,5}{2,7}$	-	-	-
801-900	17	34,2	2,0	$\frac{34,1}{99,8}$	$\frac{0,1}{0,2}$	-	-	-
901-1000	8	21,7	2,7	$\frac{21,6}{99,6}$	$\frac{0,1}{0,4}$	-	-	-
1001-1100	9	30,9	3,4	$\frac{30,8}{99,7}$	$\frac{0,1}{0,3}$	-	-	-
1101-1200	3	15,5	5,2	$\frac{15,5}{100,0}$	-	-	-	-
1201-1300	1	2,0	2,0	$\frac{2,0}{100,0}$	-	-	-	-
Total:	242	737,0	3,0	$\frac{704,4}{95,7}$	$\frac{31,4}{4,3}$	$\frac{0,1}{+}$	-	$\frac{0,2}{+}$

List of publications

1. V.K.Zilanov - 1970 - Some of the biological features, peculiarities of sweep and fishery of macrurus (*M.rupestris*) in the Northern Atlantic. The materials of commercial fishery study of the Northern basin. Issue XVI (Part II). Murmansk.
F.M.Troyanovsky
L.I.Shepel
2. K.G.Konstantinov, - 1972- Feeding habits and feeding interrelations of macrurus (*M.rupestris*) and other deep water fishes in the North-West Atlantic. Scientific works of PINRO, Issue XXVIII. Murmansk.
S.G.Podrazhanskaya
3. L.N.Pechenik, - 1970 - The reserve base of trawl fishery at the continental slope in the North Atlantic. Murmansk.
F.M.Trojanovsky
4. S.G.Podrazhanskaya - 1969 - Feeding habits of macrurus (*M.rupestris*) in some areas of the North-West Atlantic and in the waters off Iceland. The works of the VNIIRO young scientists. Issue 1, Moscow.
5. P.I.Savvatinsky - 1969 - North Atlantic macrurus. Murmansk.

